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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/986,323	11/08/2001	Chidane Ouchi	684.3279	5126

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EXAMINER

ESPLIN, DAVID B

ART UNIT PAPER NUMBER

2851

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/986,323

Applicant(s)

OUCHI, CHIDANE

Examiner

D. Ben Esplin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The previously made 35 U.S.C. 112 first paragraph rejection of claims 8 and 10 is withdrawn. Although specific structure for an optical system operable to transform laser light into incoherent light is not described, Examiner is satisfied that such systems are well known in the art and Applicant has made sufficient disclosure of the invention that would allow one of ordinary skill in the art to make and/or use it.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-6 and 11-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,789,734 to Torigoe et al. in view of European Patent Application 0 820 132 to Ohmi et al.

FIG. 1 of Torigoe et al. shows an exposure apparatus including an illumination optical system (illumination optical system 1) for illuminating a pattern of a reticle (reticle 30), a projection optical system (projection optical system 31) for projecting the illuminated pattern onto a subject (wafer 32), and an interferometer operable while using laser light outputted from the illumination optical system via an optical fiber 82. The interferometer shown by Torigoe

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includes a reflection member (reference flat 81) disposed on a stage (X-Y-Z stage 34) for holding the subject, and forms an interference fringe for measurement of the wavefront aberration (spherical aberration) of the projection optical system (see abstract). The apparatus shown further includes a photoelectric converter (light receiving elements 72 and 75), and an operation unit (spherical aberration measurement control 61). Torigoe also teaches that wavelength control of the illumination optical system may be used (col. 9 lines 65+).

Although the interferometer shown in Torigoe is a Twyman-Green interferometer, and not the Fizeau variety, Applicant acknowledges that Fizeau interferometers are well known in the art as substitutes for Twyman-Green interferometers (page 8 line 25 – page 9 line3). Therefore, it would have been obvious to one of ordinary skill in the art to replace the interferometer shown in Torigoe with one of the Fizeau variety as an art recognized equivalent.

Further, the illumination optical system of Torigoe is described as including an excimer laser, but the light source is not further defined as being a pulsed or continuous emission laser. However, Ohmi discloses a continuous emission excimer laser (see abstract) and teaches that continuous emission lasers are desirable over pulsed emission lasers in order to reduce the load on lenses, simplify the mirror or laser scanning control system, and prolong the life of the excimer laser (see page 3 lines 28-31). In view of the teachings of Ohmi, it would have been obvious to include a continuous emission excimer laser as the excimer laser called for in the illumination system of Torigoe in order to provide the apparatus of Torigoe with the advantages described by Ohmi.

The illumination optical system of Torigoe does include an excimer laser, but does not teach of injection locking the excimer laser in order to bring its wavelength within the design

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value more quickly. Applicant teaches the time delay between the powering on of a laser and the point at which the wavelength of the emitted light reaches the design value is common and is solved by including a pulse emission laser for injecting laser light into the excimer laser (page 27 lines 18+). Thus it would have been obvious to use injection locking in the apparatus of Torigoe in order to overcome this lag time.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torigoe as applied to claims 1-4, 6, 11, and 13 above, and further in view of U.S. Patent No. 6,256,087 to Bader.

The apparatus of Torigoe uses the optical fiber 82 to guide light from the illumination optical system to the interferometer, and not a semitransparent mirror. FIG. 1 of Bader shows that the use of a semitransparent mirror (deflecting mirror 5) to guide light from an illumination system of an exposure apparatus away from the exposure function for an auxiliary purpose was well known in the art. In view of the teachings of Bader, it would have been obvious to replace the optical fiber 82 of Torigoe with a semitransparent mirror, to guide light from the illumination optical system to the interferometer, as an art recognized alternative for guiding light in an exposure apparatus.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torigoe as applied to claims 1-4, 6, 11, and 13 above, and further in view of U.S. Patent No. 5,552,892 to Nagayama.

The apparatus of Torigoe uses the optical fiber 82 to guide light from the illumination optical system to the interferometer, and not an actuated mirror. FIG. 1 of Nagayama shows that the use of an actuated mirror (mirror 33) to guide light from an illumination system of an exposure apparatus away from the exposure function for an auxiliary purpose was well known in the art. In view of the teachings of Nagayama, it would have been obvious to replace the optical fiber 82 of Torigoe with an actuated mirror, to guide light from the illumination optical system to the interferometer, as an art recognized alternative for guiding light in an exposure apparatus.

Response to Arguments

Applicant's arguments with respect to claims 1-15 have been considered but are moot in view of the new ground(s) of rejection.

Applicant's argument that Torgoe does not teach of specifically using a continuous emission excimer laser is found to be persuasive. To rectify this deficiency in the rejection Examiner has cited Ohmi, included in Applicant's IDS, which teaches that the use of a continuous emission excimer laser is advantageous over a pulsed emission laser. Thus providing motivation for including such a light source within the apparatus of Torigoe.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent No. 6,278,514 to Ohsaki discloses an exposure apparatus including an interferometer for measuring wavefront aberrations by using light from an exposure light providing system.

Note: Per Applicant's request a supplemental initialed copy of the IDS filed 1/24/02 has been provided with this action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to D. Ben Esplin whose telephone number is (703) 305-4022. The examiner can normally be reached on Mon.-Fri. (8am-4:30 pm).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russell E. Adams can be reached on (703) 308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



DBE

April 18, 2003



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